

correspondence to the high data rate and high dynamics of the data rate of some connections V1, V2.

The signaling device determines TFCI values for the selected combinations of transport formats TF for the services S1, S2, S3 and performs in-band signaling of the transport formats TF. In the separate channel FACH, the mapping specification for TFCI value to combination of transport formats TF and used channels DCH, DSCH is signaled.

The layer model shown in Figure 2 shows the protocols of the radio communication system divided into three layers.

10 Layer 1: physical layer for describing all the functions for bit transmission via a physical medium (e.g., coding, modulation, transmission power monitoring, synchronization etc.).

Layer 2: data link layer for describing the mapping of data onto the physical layer, and monitoring thereof.

15 Layer 3: network layer for controlling the resources of the radio interface.

Layer 3 stipulates the TFCS for a connection, while layer 2 selects a combination (of a TFC) which is signaled in-band using a TFCI, as shown later.

The parameter exchange between layers 1 and 2 supports the functions of transferring frames with data for layer 2 via the radio interface and of displaying the status of layer 1 to higher layers. The parameter exchange between layers 1 and 3 supports monitoring of the configuration of the transmission in layer 1 and generates system information relating to layer 1.

In this case, the mapping of the data for various connections S onto a common physical channel Phy CH and the signaling of the allocation of a common channel DSCH correspond to the interaction of layers 1 and 2.

Figures 3 and 4 show the need for transport formats TF to be signaled for currently transmitted services.

Figure 3 shows, as an illustration of function, a coding and multiplex unit which maps data from a number of data channels DCH (which each correspond to the data for a service S1, S2, S3) onto a coded common transport channel CCTrCH.

In this context, mapping is a specification governing the bit pattern which is to be used for entering the data into a serial data sequence. A demultiplexer/allocation device distributes the data for the coded common transport channel CCTrCH over a number of physical channels Phy CH. The physical channels Phy CH are, thus,  
5 constantly used to transmit data for a number of services S1, S2, S3 in each case. A physical channel Phy CH is not allocated to one service S1 or S2 or S3 alone, but rather is allocated to the coded common transport channel CCTrCH with all its services S1, S2, S3.

Since the reception end needs to reconstruct this mapping and needs to read  
10 the data from the physical channels Phy CH and present them again in separate transport channels DCH for the services, signaling is necessary. This signaling in the form of TFCI values depicts the currently used combination of the transport formats TF for the services and, as shown later, the current allocation of a common channel or of a number of common channels DSCH. It has been agreed at  
15 connection setup which combinations are permitted for the connection (TFCS).

Two options in the relationship between data rate and service combinations can be implemented (cf. also EP 98 122 719):

1. Each data rate GR corresponds to precisely one combination of transport formats TF.
- 20 2. For each data rate GR, a number of combinations of transport formats TF are possible which can be distinguished using TFCI values.

Figure 4 shows the mapping in a slightly modified form, with it becoming clear that the partial information item TFCI need be signaled only when physical channels Phy CH are jointly used by a number of services S1, S2, S3. If a service  
25 S1 or S2 or S3 uses one physical channel Phy CH exclusively, then signaling of the partial information item TFCI can be dispensed with.

The allocation of a common channel DSCH to a connection V is shown with reference to Figures 5 and 6 using an example having two mobile stations MS and, hence, two connections V1, V2. Let it be assumed that the connections 1 and 2  
30 each can transmit their data using the data rates of 16, 32 and 48 kbps, with three

common channels DSCH each having 16 kbps being available for both connections V1, V2. For the two connections V1, V2, the tables shown in Figures 5 and 6 each stipulate which of these common channels DSCH can be used to transmit which data rates. This table has been stipulated at the start of connection, but also may be  
5 changed concurrently with the connection.

Since the two connections V1, V2 exist in parallel, only particular combinations of the data rates are permitted, in order to prevent simultaneous use of the common channels DSCH. These are indicated in the table shown in Figure 7.

In this example, only 10 of 16 possible combinations are permitted. All the  
10 combinations in which more than 16 kbps are transmitted simultaneously for the two connections V1, V2 must be excluded.

In general, the described implicit allocation of common channels DSCH allows the available channels to be split over all the connections V1, V2 with such flexibility that each individual connection V1, V2 is able to use a much higher  
15 transmission capacity than in the case of fixed allocation of the channels as dedicated channels DCH.

In this case, for statistical reasons, the limitation to particular combinations becomes less significant the more connections V1, V2 and common channels DSCH are available. This assumes that the ratio of the maximum data rate  
20 required by all connections V1, V2 to the data rate which is possible as a result of the use of all common channels DSCH remains constant.

An additional degree of freedom is possible if not every data rate has a fixed mapping, i.e. uniquely onto prescribed TFCI values, but instead alternatives can be chosen. For the purposes of illustration, Figure 8 shows, for a connection V1, the  
25 incorporation of the configuration of the common channels DSCH into the information signaled by the TFCI values.

A TFCI value represents a particular configuration of the services S1 to S3. To date, only one TFCI value for each permitted combination was appropriate. The extension by the configuration data for the common channels DSCH can now be  
30 used to allocate a particular service combination to different combinations of